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Editorial.

ON VERSATILITY.

THE ability to turn with ease from one method of doing a thing to another, from one way of treating a case to a second or third, and from one therapeutical view-point and application to a fresh vantage ground, has its value. Many-sidedness may prevent a person becoming stuck fast and overcome by a difficulty. A troublesome problem of cure may be solved satisfactorily by a man capable of various knowledgeable assiduity, whereas he of one idea will become hopelessly gravelled and unsuccessful by reason of his narrow outlook and scant armoury. The young man who sees practice under two or three tutors will have a better idea of different methods of accomplishing an end than he who spends his time sitting at the feet of one Gamaliel. To be really skilled in medical and surgical many-sidedness one must have a gymnastic mind, a dextrous hand, have moved about a little, seen things, assimilated the good and discarded the bad.

We are sorry to state that professional etiquette among us is not what it ought to be, and the ideal consultant is none too prevalent in our profession. Not a few men shiver when consulting has to be done. Versatility in the treatment of disease tends to lessen the necessity for consultations. But this varied application of knowledge must be wise, judicious, reasoned, and not of the mountebank or charlatan type. A noted doctor, who had been in practice many years, attributed much of his success in the treatment of a long series of cases to his strict adherence to the use of *one* drug. We have heard of a consultant who relied solely on the production of his effects, chiefly on the client, by ascertaining the medication that had already been used on a case and then suggesting some out-of-the-way agent difficult to

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find in the Pharmacopœia and which the attending practitioner had possibly never heard of. This was always his plan of action. The veterinary surgeon who will probably achieve the best results in everyday practice will be he who adopts a steady mean between the way of the noted doctor and that of the wily consultant. The former might have achieved his results quicker if he had been more versatile, and the latter could hardly have had sufficient experience of all the rare things he advocated, although there is not much doubt he had studied human nature well in certain circles. To be really skilled in the use of therapeutic remedies externally and internally a man must read extensively, have some acquaintance with the records of foreign literature as well as that of his own land, and have practised over a wide field. Ability to turn from one curative agent to another never has its value more declared than in the treatment of such diseases as mange, canker, grease, &c.

In these days, in order to advance and earn one's bread and butter, it is almost essential to have experience of horse, cattle, and dog practice, and even sheep and pigs need consideration. The day of the horse field of practice only seems to have gone for ever. At present the ideal practitioner is he who is at home with any class of stock. Recently the biblical edict that "the first shall be last, and the last first" has received much exemplification in our ranks. One reason for the reversal has been lack of versatility (due to there being at one time little reason for its exercise), and the other the advent of motorism. From a monetary point of view, and notwithstanding "the bridge that carries us over" aphorism, we can see an advantage, to the young man at any rate, not knowing where he will finally settle, in being able to castrate a colt either by clams, torsion, écraseur, or emasculator, and either with his subject standing or recumbent. In general surgical methods, provided we do not wilfully disregard the cardinal rules of procedure, there is room also for the exhibition of versatility.

In the real scientist many-sidedness of mind must ever be in evidence. We must not lose intellectual elasticity as we advance in years if we are to be truly progressive. "Walk with the boys as long as ever you can" is a good motto. A change of field of observation is useful in keeping the mind flexible and the hand supple. "There is nobody under 30 so dead but

his heart will stir a little at sight of a gipsies' camp. Youth will now and again find a brave word to say in dispraise of riches, and throw up a situation to go strolling with a knapsack."

"To hold the same views at 40 as we held at 20 is to have been stupefied for a score of years and take rank not as a prophet, but as an unteachable brat, well birched, and none the wiser. It is as if a ship's captain should sail to India from the Port of London, and having brought a chart of the Thames on deck at his first setting out, should obstinately use no other for the whole voyage."—G. M.

FRENCH DOGS OF WAR.

Not much has been written about them, but dogs are doing their "little bit" as well as their masters, says the *Sunday Chronicle*. In the French Army there are more than five hundred trained dogs at the front, some of which have become famous, as "True," which has himself saved the lives of a hundred and fifty wounded. Their duties on the field range from seeking the wounded, discovering the hidden enemy, to carrying messages. The Germans were not long is finding out the menace of these seemingly innocent *toutous* which wandered about in front of the trenches, and now they shoot every dog at sight.

I had the privilege of visiting the other day the training quarters in the Place Felix-Faure, at Grenelle, where the French "dogs of war" are trained. Practically none but sheep-dogs are used for the purpose, I was told, but these come from various parts, from Flanders from Beauce, and some even from over the German frontier. It has been found that by their blood and ancestry they take quickly and kindly to the vagabond life of the trenches and of the woods, and seem to love the sudden alerts, the vigils under the stars, the trust put in them. At Grenelle the dogs are lodged in kennels in a sort of miniature prairie, which gives ample scope for training.

M. Farges, the trainer, told me that it took on an average two months to prepare a dog for active service. Some were suited for one kind of work, others for another. One fine animal, almost human in its intelligence, he told me had been brought one day by a mother in deep mourning whose only son had fallen at Ypres. All she said as she handed him over was: "I bring you the constant companion of my son. He will serve his country as faithfully as he did." And that is what they are being prepared to do, these dogs; and then they are sent to the front, wearing a uniform, bearing a number, submitting to discipline, like any human soldier among the lot. I saw them at their exercises, and they were wonderful; but when one has watched a collie on a Highland hill among his sheep one was not over astonished.

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General Articles.

MEMORANDUM ON THE TREATMENT OF THE BACTERIAL INFECTIONS OF PROJECTILE WOUNDS.

By Colonels F. F. BURGHARD, Sir W. B. LEISHMAN, F.R.S., Sir B. MOYNIHAN, and Sir A. E. WRIGHT, F.R.S.
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Object of this Memorandum.

It is proposed in this Memorandum (*a*) to synopsize the experience obtained in connection with wounds in this War; (*b*) to supplement this by setting out the chief data which have been furnished by a bacteriological study of the wounds; and (*c*) to lay down certain broad principles of treatment for the guidance of those who have not seen the conditions in the present War, or who have seen only an early or a late phase in the history of the wounds.

The present Memorandum will be followed up, as soon as certain researches are completed, by Memoranda on the employment of antiseptics and vaccines respectively.

I.—Characters of Projectile Wounds and Bacteriology of the Initial Infection.

The wounds made by projectiles are not in any respect comparable to clean-cut, swabbed out, aseptic operation wounds, or to any of the accident wounds seen in civil surgery.

Special Characters of Projectile Wounds.

Where the projectile has passed through the flesh there will, in the ordinary case, be a torn and ragged track with an irregular surface of heights and hollows produced by the hernia of muscle and the retraction of the severed fibres. Where the projectile has come against bone this will be generally splintered, and the track will lead down into widely ramifying crevices between comminuted fragments.

There will also in practically every artillery wound be included foreign matter: a projectile, or shreds of clothing, or fragments of bone, and with these lacerated muscular and connective tissues which will slough. In addition, the wound will be full of blood clot and effused lymph. And lastly, the projectile, when it has

traversed soiled clothes or a soiled skin surface, will have carried in microbes, and these will have been sown all along the track.

This deep sowing of microbes, taken together with the blockage of the wound by blood clot, and the not infrequent obliteration of a section of the track by hernia of muscle, will, in the case of any deep or perforating wound, make the effective sterilization of the wound by antiseptics impossible.

Enumeration of the More Important Microbes which are carried into the Wounds.

Of the microbes which are carried into the wound the most formidable are the anaerobes and facultative anaerobes. These are found in very large numbers in practically every case arriving at the base from the Front.

Three species of microbes here come into consideration. The *streptococcus*, the one microbe which is, one may say, invariably present, is primarily responsible for the suppuration which will supervene in the wound. The *tetanus bacillus*, or a bacillus which is morphologically indistinguishable from this, is present in the pus from a certain proportion of cases. And in practically all the wounds we have also the *Bacillus aerogenes capsulatus* of Welch (*B. perfringens*). This produces a characteristically offensive, thick, frothy, rusty brown, sometimes almost fæcal, discharge.

Probable Derivation of these Anaerobic Microbes.—All these microbes would seem to be of fæcal derivation. The *B. perfringens* in particular is an inhabitant of the alimentary tract, and it can (by implanting in boiling milk and anaerobic cultivation) be readily recovered from the fæces of men and animals, from earth soiled with fæces, and from the soiled uniform of the soldier.

Disorders produced by the Anaerobic Infection.

The anaerobic infections of the imprisoned discharges which are here in question, may, if unchecked, lead to graver consequences. The streptococcal infection may lead to an infection of the tissues in the form of erysipelas or deep cellulitis, and it may culminate in septicæmia. The tetanus infection will, if the microbe cultivates itself sufficiently freely, and elaborates enough toxin in the wound, give rise to tetanus. And the bacillus of

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Welch, when it manages to invade the tissues, will generate gas producing a gas phlegmon, and also an obstructive gangrene in the affected limb (so-called *gaseous gangrene*).

II.—Measures for Checking the Anaerobic Infection of Discharges and Preventing the Development of Tetanus, Gas Phlegmon with Gangrene, and Streptococcal Infection of the Tissues.

The rational line of treatment for the prevention of the grave sequelæ which are here in question will be to check at the earliest possible moment the anaerobic infection of the discharges.

Opening Up, Cleaning, and Draining of Wounds.

The wound ought to be freely opened up. It ought then to be carefully cleansed with an antiseptic solution (*vide* Memorandum on Antiseptics—Therapeutic Employment); all foreign bodies, sloughs, and blood clot (as far as this is possible without risk of hæmorrhage) being carefully removed. Then a very wide drainage tube, which will admit air to the interior, ought to be inserted, and, especially in those cases where there is much laceration, steps ought to be taken to promote the outflow of lymph from the walls of the wound (*vide infra*, Section IV).

By such steps we may hope to put an end to the anaerobic infection, and to obtain, instead of foul-smelling, gas-impregnated, decomposing discharges, a more or less "laudable pus."

Precautionary Measures to be taken where the above Treatment cannot be carried out.

Where, owing to the exigencies of war conditions, it is for the moment impossible to carry out the required surgical measures, or where from the nature of the case the wound cannot be effectively drained, it will be specially important to abstain from doing anything which might still further favour the anaerobic infection.

(*a*) *Points to be attended to in the Interim Treatment of Wounds.*—Wounds should not be sewn up after operation. We can never be sure that the projectile has not carried in infection, and we cannot under war conditions and during transport count upon the patient being kept, as he should be, under continuous observation. Plugs, except where there is actual risk of hæmorrhage, should never be left behind in the wound. For they bank

back the discharges and establish anaerobic conditions. For the same reasons it will be necessary to see that the wound is not wrapped up air-tight; that discharges are not allowed to dry upon the bandages; and that the mouths of drainage tubes are not blocked by the pressure of the dressings.

(*b*) *Prophylactic Inoculation of Anti-tetanus Serum.*—Moreover, it will, pending the opening up and cleansing of the wound, be very desirable to take certain specific prophylactic measures. By an injection of anti-tetanic serum we may hope to neutralize any tetanic poison which may be absorbed from the wound.

(*c*) *Prophylactic Inoculation of Anti-gangrene and Antisepsis Vaccine.*—Further, by the injection of a prophylactic dose of a vaccine containing the bacillus of Welch and the streptococcus (issued as *Combined Antigangrene and Antisepsis Vaccine*), we may hope to stave off an invasion of the tissues by these micro-organisms (*vide* Memorandum on the Employment of Vaccines). It must, however, be clearly realized with regard to these measures that they are only temporizing methods, and ancillary to such cleansing and drainage of the wounds as may in a particular case have been for the moment practicable.

III.—Treatment of Streptococcus Infections of the Tissues and "Gas Phlegmon."

When, by an unchecked anaerobic infection of the discharges, the resistance of the tissues has been lowered, and these have been invaded by microbes, it will be necessary to take immediate steps to stem that invasion.

We have at disposal two different methods of procedure. (*a*) We may take steps to increase the antibacterial powers of the blood fluids. (*b*) We may lay open and effectively drain the tissues (*vide infra*, Section IV) and so bring back to these their normal resisting power. These methods will be applicable according to circumstances, separately or in combination.

Erysipelas.—A streptococcal infection which takes the form of erysipelas can practically be always promptly extinguished by an injection of streptococcus vaccine (*vide* Memorandum on Employment of Vaccines) without recourse to any surgical measures.

Cellulitis.—When a streptococcal infection takes the form of a diffuse cellulitis, vaccine therapy will rank only as an auxiliary measure, and the laying open of the infected tissues and the

establishment of effective lymph lavage by the method indicated in the next section will be the essential.

What applies to the case of streptococcal cellulitis applies *a fortiori* to all infections of the tissues by the *bacillus of Welch.* In every case these must be opened up and effective lymph lavage induced.

Gas Phlegmon.

In connection with the actual surgical measures we have two cases to consider:—

(*a*) *Gas Phlegmon affecting the Subcutaneous Tissue.*—Where the infection follows a superficial course, manifesting itself in dusky blotchings of the skin and gaseous emphysema in the subcutaneous tissue, it will suffice to open this up freely by incisions carried down to the plane of the muscle. (And it is here thrown out as a suggestion that a more efficient evacuation of the lymph would be obtained if the incisions were disposed transversely instead of axially to the limb.)

(*b*) *Gas Phlegmon affecting the Deeper Tissues.*—Where the deeper tissues are diffusely invaded, and where the limb, owing to the internal tension, has assumed a blanched wax-like appearance, incisions into the subcutaneous tissue would not relieve matters, for the underlying muscle would protrude into and block the wounds. In these eminently dangerous cases it will generally be necessary to amputate. But it may sometimes be possible to save the limb by the free opening up of the deeper tissues and the introduction of large drainage tubes. In amputating for diffuse infection of the deeper tissues, or, as the case may be, for a progressive infection of the subcutaneous tissue, it is advisable, inasmuch as it is in these cases essential to obtain an absolute maximum of drainage, to do the flapless amputation —that is, to cut across all the tissues at one and the same level, and to leave the wound completely open.

IV.—General Considerations in Connection with Drainage, and Measures for promoting the Outflow of Lymph from an Incision or the Infiltrated Wall of a Wound.

The primary object of all opening up of wounds, and infected tissues, in short of all drainage operations, is, of course, to provide issue for pus and infected discharges.

The Mere Provision of an Outlet does not Satisfy Requirements.

But the mere provision of an outlet is not enough; nor is it enough to see the outlet so disposed as to allow of gravity carrying off accumulated discharges.

Lymph Lavage must be Superadded.

What we are seeking to secure will not have been attained until such lymph as may have become poisonous to leucocytes and impotent upon bacteria has been extracted from the tissues; until that lymph has been replaced by a lymph which is favourable to phagocytic activity and inimical to microbes; and until this last is being "drawn" into the wound and is establishing in it conditions which are favourable to healing.

When anything less than this has been achieved by the use of the knife, and in particular in the case where, in despite of incisions, the infective process has advanced, our drainage operation will have failed in its object, and our failure will be attributable to a sealing up of the fenestræ in the tissues, and a stanching of the lymph outflow.

Hypertonic Solutions of Salt will promote the Outflow of Lymph from the Walls of a Wound.

The remedy for this is to apply to the wound a hypertonic solution of salt to promote the outflow of lymph.

For ordinary use the best application will be a 5 per cent. solution of common salt combined with $\frac{1}{2}$ per cent. citrate of soda to render the lymph incoagulable. Where citrate of soda, or a similar decalcifiant, is not available, a simple 5 per cent. solution of salt will serve. Sea-water, this being equivalent to a 2·5 per cent. solution of salt, may also be employed. In dealing with dry and infiltrated wound surfaces stronger solutions of salt (up to 10 per cent.) will be found to resolve the induration and to clean up the wound surfaces much more quickly than weaker solutions.

In the case of deep wounds the simplest procedure will be to pour in the hypertonic solution and then plug lightly with gauze. Superficial wounds may be dealt with by laying on gauze thoroughly soaked in the solution. The limb should then be wrapped in waterproof material to prevent the bed becoming

soaked with the very copious discharge; and an application of vaseline will prevent irritation of the skin and stinging on freshly cut skin surfaces.

When the "Drawing Agent" has cleaned up Wound it is to be Discontinued.

The "drawing agent" has done its work as soon as it has checked the spreading invasion of the tissues; or has cleaned up the dry and indurated wound surface, and this last has clothed itself in bright coral-red granulations. The hypertonic salt solution may then be replaced by some simple dressing (*vide* the final paragraph of this Memorandum).

V.—Treatment of the Suppuration which will Supervene upon the Laying Open of Wounds and Infected Tissues.

The laying open of the wound or the infected tissue effects, as consideration will show, only the conversion of a more, into a less, dangerous form of infection; and we are, after our operative procedures, faced with a suppurative infection of our open wound, and of our superadded incisions; and have now to check that infection.

It will in practically every case be an infection by the streptococcus combined with the staphylococcus. And in very many cases there will be a superadded infection by coliform organisms, in particular by the *B. proteus*.

The therapeutic methods which we have here at disposal are the following:—

(1) Provision of Satisfactory Drainage and Lymph Lavage.

The first and most important thing will be to provide in the dependent portion of the wound a free outlet for the discharges, and to secure, when we are dealing with infiltrated wound surfaces, a free outflow of lymph (*vide* Section IV).

If, by either of these methods, or by a combination of the two, we succeed in providing effective lymph lavage for our wound, we shall have very little difficulty with the infection.

But it will, in a very large proportion of cases, be quite impracticable to obtain all that would be desirable in the matter of drainage; and it is all-important to recognize, in connection

with these cases, that "conservative surgery," as applied to the wounded, means making, for the purpose of conserving a limb, legitimate sacrifices with respect to drainage. The question, and it is the most anxious and responsible question in all surgical procedures, as to how far one may sacrifice drainage, can only be arrived at by balancing in each particular case the advantage of preserving a limb against the risks of long-continued suppuration and eventual septicæmia.

We require here to have clear conceptions as to what amount of help is obtainable, on the one hand from *vaccine therapy*, from the employment of *antiseptics* in the wound, and from *frequent dressings*.

(2) Vaccine Therapy in its Application to suppurating Wounds.

It is important in connection with this method of treatment to realize (*a*) that it aims at increasing the anti-bacterial powers of the blood, and (*b*) that the conditions which determine our success or failure are essentially the same when we employ vaccines as when we set ourselves to combat infections by the aid of the antibacterial power of the normal blood.

Ideally favourable conditions for the successful employment of a vaccine will be given when this is employed in treating a perfectly well-drained wound (let us say such a wound as that furnished by a flapless amputation); or, again, in treating an incursion of a microbe into a tissue where there is a very free lymph flow (let us say, such an infection as erysipelas). Here, by the use of an appropriate dose of the proper vaccine or vaccine mixture, successful results may be confidently expected.

The most unpromising cases for vaccine treatment are those where we are dealing with an unopened abscess sac, or a quite undrained wound, or an old-standing cicatrized tissue infection. Here the microbes are shut off from the blood fluids, and in these cases the utmost we have any right to expect is to prevent an extension of the infection and to ward off septicæmic complications.

In the case here specially in view, that of the imperfectly drained wound, we may expect to obtain by the repeated inoculation of the appropriate dose of the proper vaccine or vaccine

mixture, not anything in the nature of dramatic results, but a certain improvement in the local conditions, together with a certain protection against septicæmia.

We may, in short, expect from vaccine therapy results which will make it possible to employ conservative methods in a larger proportion of cases; to hold on longer to these methods; and to carry them oftener to a successful issue. It would therefore be advisable to carry out vaccine therapy as part of the routine treatment of suppurating wounds. (*Vide* Instructions issued with Antisepsis Vaccine.)

(3) Employment of Antiseptics in Wounds.

Therapeutic Employment of Antiseptics has given Disappointing Results.

It is notorious that the results of the treatment of suppurating wounds by antiseptics are disappointing, and that the reasoning which led to the universal adoption of this therapeutic method was, in point of fact, too unsophisticated.

It was tacitly assumed of chemical agents which acted as antiseptics in watery solution that they would do so also in blood fluids and pus; and that they would also penetrate a certain distance into the tissues and into blood clots. We now know that antiseptics do in these respects very much less than was anticipated.

It was further tacitly assumed that an antiseptic which gave good results with one particular microbe or group of microbes ought to give good results indiscriminately with all. But it is possible that particular antiseptics may be appropriate to particular microbes and groups of microbes; that, for instance, such an antiseptic as peroxide of hydrogen, which has very little effect on ordinary pyogenic microbes, may be specially effective on anaerobic micro-organisms.

Importance of Selecting the Appropriate Antiseptic for each Class of Case.

But, at any rate, the principle has emerged that, in choosing our antiseptics and the strength in which these are to be used, we ought to guide ourselves by actual experiments on wounds and on the microbes which come into consideration in connection with those wounds. And it would be clearly inadmissible in

choosing antiseptics for employment in projectile wounds to leave out of sight the fact that anaerobic microbes and their spores have to be dealt with, and that the antiseptics we employ ought to be competent to kill these.

Discussion of Advantage expected from a Partial Sterilization.

Again, it is still tacitly assumed by practically every one who employs antiseptics that, even if treatment with an antiseptic effects only a partial sterilization, such partial sterilization will always be something to the good.

This amounts in point of fact to the assumption that by substituting a smaller for a larger sowing the number of microbes in a culture will always be sensibly reduced.

In reality this will depend upon two factors, (*a*) the nature of the culture medium, and (*b*) the shorter or longer period allowed for the cultivation.

When we are dealing with a culture medium which is ideally favourable to the multiplication of microbes, the smaller sowing will, after a short space of time, give exactly the same number of microbes as the larger.

When we have a culture medium in which microbes develop very slowly, the smaller sowing will for a very long time give a correspondingly smaller number of microbes.

When a cultivation medium which is unfavourable to microbes is after a certain lapse of time converted into a medium which is favourable to them, it will not be the larger or the smaller sowing, but the date at which the character of the fluid changes, which will govern the result.

Evolution of Events in an Infected Wound rythmically after each Dressing.

We have now to apply these general principles to the case of the cultivation of microbes in wounds; and we may consider first the evolution of events in wounds treated without antiseptics, and then inquire in what respect the use of antiseptics could modify this evolution.

There will, after washing out, remain behind in every wound a certain quantum of pus. In one case it will be a question of minimal collections left in the shallow depressions of a granulating surface; in another a question of quite large collections held up in inaccessible pockets.

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This residual pus will furnish the sowing of microbes, and a culture will be set going as soon as lymph begins to trickle into the wound.

But the new culture will start off very slowly, and for two reasons: *First*, because the lymph in the condition in which it exudes inhibits nearly all the microbial growth; *secondly*, because we have in the lymph phagocytically active leucocytes.

For a certain time these natural checks or microbial growths will be maintained. The conditions will, however, when the lymph is fouled by an appreciable mixture of residual pus, change rapidly. Phagocytosis will be arrested, and the effused lymph will be transformed into a medium which will be eminently favourable to the multiplication of all manner of microbes. If we now wait for only a few more hours we shall have in the wound a very luxuriant growth.

Coming now to the question how good could come of the employment of antiseptics in wounds, we recognize, in the first place, that we might by these means achieve an appreciably smaller sowing of microbes. *Further*, it is conceivable that, if we were to leave behind in the wound a sufficiency of antiseptic, we might obtain from it such a reinforcement of the growth-inhibiting power of the lymph as should more than offset the set-back inflicted by the antiseptic in paralysing the phagocytic action of the leucocytes. *Lastly*, it is possible that an antiseptic, left behind in the wound in sufficient quantity, might prevent the residual pus converting the lymph into a good nutrient medium.

Smaller Sowing of Microbes probably not a Factor of Dominating Importance.

In reality these possibilities do not amount to much. It is clear that that appreciably smaller sowing of microbes which we are working for would be realized only where the whole wound surface can be thoroughly washed with an antiseptic. But these are precisely the cases where the effect of a smaller sowing of microbes would not make itself very much felt; for where the wound is left practically free of residual pus the natural checks of microbic growth would be longest maintained.

With regard to the other possibilities, all that is necessary to say is that they must rank only as possibilities, and that up

to the present experiment has not furnished anything in confirmation of the idea that the introduction of antiseptics into wounds would be likely to contribute to the arrest of suppuration.

Utility of Antiseptics in the Prevention of Outbreaks of Serious Septic Infection.

It must, however, be emphasized, in conclusion, that in the treatment of the wounded in hospital it is essential to look beyond the individual to the aggregate. And even if it were finally to emerge that the employment of antiseptics did not do anything towards the arrest of suppuration in an infected wound, the taking of careful antiseptic precautions, and the washing out of the wound by antiseptic solutions would none the less be indispensable. For if such precautions were omitted, infective microbes would inevitably be carried from one wound to another, and there would inevitably, by such "passaging," be bred out in hospital very virulent strains of microbes, which would, as in pre-Listerian days, induce all manner of fatal septic infection.

(4) Frequent and Efficient Dressing of the Wound.

Importance of Frequent Dressing of Wound.

Coming back from this general consideration to the question of the treatment of the individual infected wound, it will be clear from what has been said above that the frequent and efficient washing out and dressing of the wound will be a factor of dominating importance in the treatment of the infection. Where comparatively long intervals intervene between the dressings, where pus is left behind in the wound, where the discharges are confined by plugs or multiple folds of dressing, and where, in the case of a deep wound, too small drainage tubes are employed, little or no progress will be made. Where large drainage tubes are employed, where the wound is frequently washed out, where no pus is left behind, and where only a very light dressing is employed, we shall be making progress.

Continuous Immersion or Irrigation for Heavily Infected Wounds.

And clearly, so long as a wound is heavily infected, the ideal method of treatment, if only it were always practicable,

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would be immersion in a bath or continuous irrigation with some aseptic, or mildly antiseptic fluid.

Exposure to Air and Drying Off of Wounds after Infection has been Brought under Control.

When the continuous bath or, as the case may be, lymph lavage induced by hypertonic salt solution, has brought the infection under control, what remains of that infection may very often be extinguished by freely exposing the open wound to the air. The part which the drying off of the wound surfaces and the concentration of the discharges plays in the killing off of the residual microbes has not yet been investigated.

(NOTE.—The recommendations with regard to surgery which are put forward in the memorandum have been formulated in consultation with Colonel Sir B. Moynihan and Colonel F. F. Burghard.)—*British Medical Journal.*

INJECTION OF OXYGEN AS A TREATMENT FOR TETANUS.

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As *Bacillus tetani* is an obligate anaerobe and will not develop in the presence of the smallest amount of oxygen, it was thought that the injection of oxygen into a tetanus wound, and into the tissue immediately surrounding the wound, would be more or less efficacious as a treatment, or auxiliary treatment, in delaying the onset of the disease or rendering it less acute, if not in preventing the development of the disease altogether.

In the *Canadian Medical Association Journal* for November, 1914, one of us (H. O. H.) reported beneficial results from the subcutaneous injection of oxygen in cases of dyspnœa of tuberculosis, gas poisoning, pneumonia, œdema of lungs, bronchial asthma, and operative cases, and the success with this treatment led to the surmise that it might be valuable in cases of tetanus and other anaerobic infections, such as malignant œdema, symptomatic anthrax, &c. The prevalence of tetanus infections, causing extreme mortality in the European War zone, made it

appear probable that a few animal inoculation experiments with tetanus and the subcutaneous injection of oxygen might be of use in ascertaining whether the treatment was of any value in this connection. Accordingly, Dr. G. C. Creelman, President of the Ontario Agricultural College, was asked if it would be possible to carry on the experiments with tetanus in the bacteriological laboratory of the College. Dr. Creelman readily gave his consent and referred the matter to one of us (D. H. J.) in charge of the laboratory. As a result, the following experiments were planned, in which we were respectively responsible for the oxygen injections and the cultures, inoculations, and subsequent observations.

Cultures Used.—A fresh culture of *B. tetani* was obtained from Parke, Davis and Co., and subcultures were made from this in dextrose beef-extract bouillon and dextrose beef-extract agar, incubated under anaerobic conditions at 37° C. for three days, and kept later at room temperature.

Virulence Tests.—To test the virulence of the cultures a guinea-pig, weighing 790 grm., was inoculated subcutaneously on the inner side of the right thigh with two drops of a three-day-old bouillon culture. After twenty-four hours tetanic symptoms were shown by the extension backwards and outwards in a rigid condition of the inoculated leg. Five hours later respiration was laboured, and the hinder half of the body was partially paralysed, being dragged around the cage with difficulty; twelve hours later —a total of forty-one hours from the time of inoculation—the animal was found dead.

Oxygen Injection Experiments.—The oxygen injected was obtained from some oxone cartridges as prepared by the Roessler and Hasslacher Chemical Co., New York, from which oxygen was generated in the portable oxygen generator made by the Hartz Company, of Toronto, Cleveland, and Detroit. The oxygen escapes by means of a long rubber tube, at the distal end of which is an aspirating needle which is inserted into the subcutaneous tissue. The tube is then oiled, and by a pumping action of the hand the oxygen is forced through the needle.

Series I.

In this series four guinea-pigs were used. They were divided into two pairs. All four were inoculated with *B. tetani*, and

one member of each pair was given an injection of oxygen near the point of inoculation, while the remaining member of each pair was kept as a control. Sufficient oxygen was given to raise an emphysema from 3 to 5 cm. in diameter in the immediate region of the point of inoculation. (*Note.*—In all the cases where tetanus developed the symptoms were similar to those described above in the virulence test, the only difference being the varying time of onset and termination of the disease.)

With the first pair of guinea-pigs where half a drop of culture was used for inoculation tetanus developed and terminated fatally in the case of the control, but had not developed where oxygen was injected eighteen days later. With the second pair, where the amount of inoculum was double that used with the first pair, tetanus developed with fatal termination in both cases, but the appearance of tetanic symptoms and subsequent death were considerably deferred by the one injection of oxygen.

Series II.

For this series the agar-plate cultures were used. To inoculate, a puncture was made through the skin with a sterile sharp instrument, then a platinum needle was drawn through the surface growth of the culture and inserted into the wound. As with Series I, four guinea-pigs were used. They were divided into pairs, and one of each pair was inoculated and immediately given a subcutaneous injection of oxygen, and the other member of each pair was inoculated and not given oxygen.

With the latter pair of guinea-pigs, as with the second pair in Series I, we noticed that while tetanus with fatal termination developed in both cases the time of onset of the disease and of death was much delayed by the oxygen injection.

We take it for granted that the reader is acquainted with the modern treatment of tetanus—*e.g.*, use of anti-tetanic serum, hypodermic injections of dilute carbolic acid solution, anæsthesia for spasms, the darkened room, chloretone, &c.—but draw attention to the fact that the only treatment used in these experimental cases was the direct deep injection of oxygen into the wounds, and we assume that if the beneficial effects in these cited cases were due to the injection of the oxygen other anaerobic infections might be at least equally well benefited.

We do not say that these limited experiments prove con-

clusively that subcutaneously injected oxygen is a sure cure for tetanus, but we think the results obtained warrant their publication, and we feel justified, in view of the fatalities that are occurring in the war zone from tetanus, to call the attention of the medical men in attendance, and others, to the beneficial effects obtained from this treatment as in the above cases, with the hope that it may in some measure aid in the prevention of, or recovery from, the disease with the wounded.

A fuller account of the experiments will be published later, and further experiments are planned which it is intended shall be carried out in the immediate future.—*Lancet.*

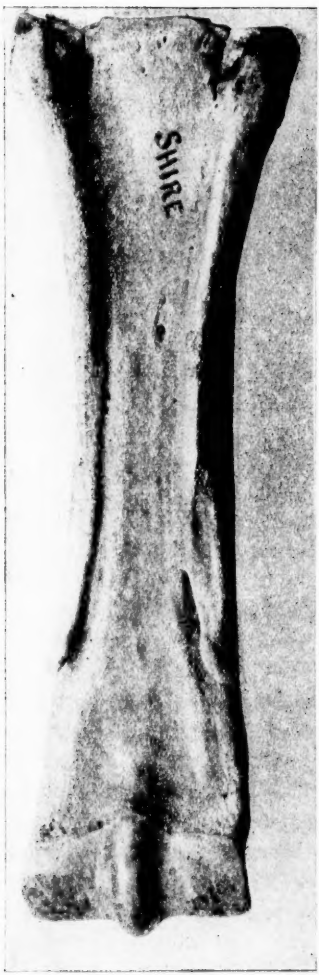
SHIRE BONE AND THOROUGHBRED BONE.

A Contrast and Comparison.

By HERBERT PRATT.

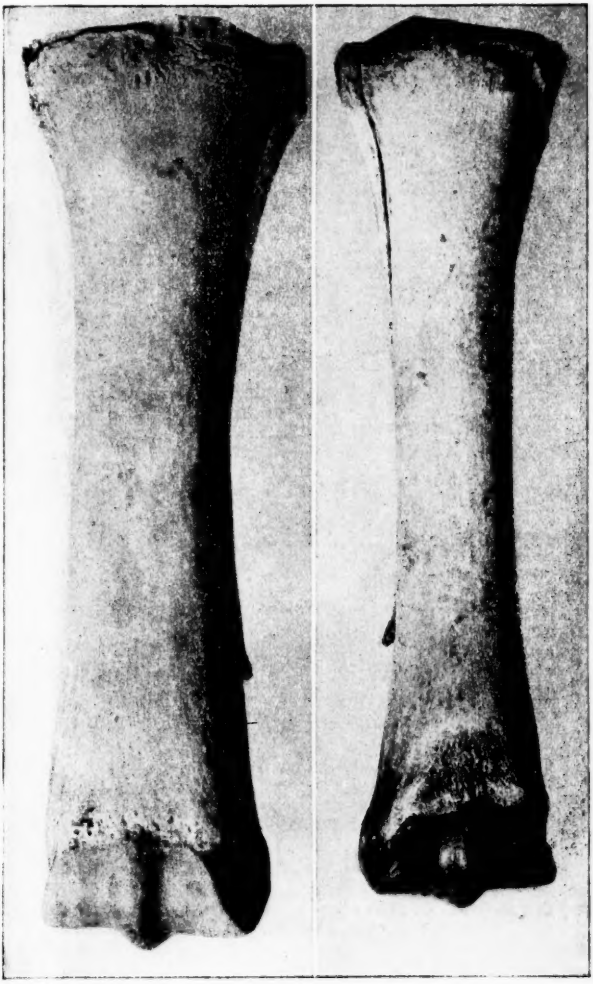
(Reproduced by special permission from *Country Life.*)

In the course of the correspondence on the "Half-bred Sire" in *Country Life* a sentence occurred in a letter written by Mr. George Cradock which gave me to think, as the French say. It was that "the deer has the finest grained bone of any animal; next to that the Arab horse, and next to that the English thoroughbred. The cart-horse has a round, spongy bone. If a section could be taken of the bone of a good thoroughbred horse of the actual area of the solid bone, and compared with the cart-horse or partly bred cart-horse, it will be found that there would be greater strength in the thoroughbred, although it would measure less." Many statements of opinion leave one with a sense that you may either agree or differ from them; there is no means of bringing the author to book, of subjecting his theories to physical tests the result of which ends the argument. They are in their nature vague and cloudy, but my matter-of-fact mind seized upon this as belonging to a different category. If animals can be classified according to the fineness of grain and density of their bone, and placed in an order of merit, such as Mr. Cradock drew up—deer, Arab horse, English thoroughbred and Shire—one would think men of science must have done the necessary weighing and calculation ages ago for the benefit of



Shire (*back*).

Thoroughbred (*back*).



Shire (front). *Thoroughbred (front).*

Cannon bones of Shire and Thoroughbred Horses. (*Half natural size.*)

XUM

Very thin section of the Shire's bone photographed by transmitted light, and enlarged to show grain.

the unlearned and merely practical men, like myself. Here it is obvious that a scientific examination ought to make further argument unnecessary, and settle once and for ever the differences between the "bone" of the thoroughbred and that of the cart-horse. In my innocence I thought all that was necessary

was to apply to one of the seats of veterinary learning and get authoritative confirmation or denial of the statement. But inquiry only laid bare the fact that I had hit upon a tiny, but important, corner of knowledge that had not been explored by our leaders in veterinary science. At the Veterinary College I asked in vain. No one had worked it out. At Cambridge University, Professor Marshall saw the importance of the investigation, but could not find time to undertake it.

Evidently, if my curiosity was to be satisfied, it would only be by starting a little research for the special benefit of readers of *Country Life*. What encouraged me to do this was the universal agreement that the knowledge gained would be of invaluable service to horse-breeding. Therefore, I began to stir up the authorities on the subject, and, luckily, was able to enlist

Shire. *Thoroughbred.*

Section cut from centre of cannon bones. (*Natural size.*)

the active co-operation of Mr. E. H. Leach, the famous veterinary surgeon of Newmarket. He sent me the cannon bones of a thoroughbred horse and of a Shire horse. These were each photographed half their natural size from three points of view. They are reproduced with these notes, and show the comparative sizes. The Shire bone has not only greater length, but considerably more bulk—facts patent to the eye, but offering a solid start for further study. The next step was to send the bones to Messrs. Watson and Sons, and ask them to cut cross sections from the centre—a delicate and fine operation, as I need scarcely say. They succeeded admirably, and I had the sections photo-

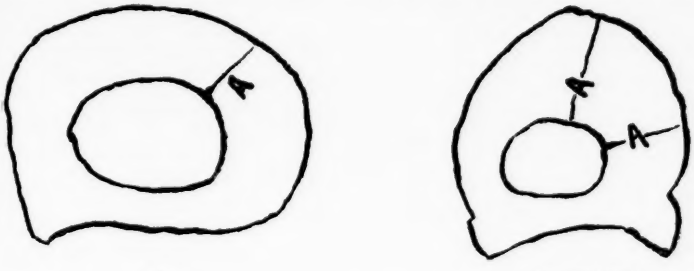
Very thin section of the thoroughbred's bone photographed by transmitted light, and enlarged in exactly the same proportion as the Shire's bone.

graphed exactly natural size, and that led to the solution of the riddle. From an accompanying illustration, where the two are shown side by side, it will be seen, firstly, that the diameter of the marrow cavity in the centre of the bone of the Shire is much greater than that of the thoroughbred. Then it will be noticed that (to the naked eye at least), though smaller in circumference, the latter appears to have quite as much actual bone as the former. If an exact calculation could be made it would add considerable value to these photographs.

And now a further step was possible. A very thin and transparent slice was cut from these two small sections—another

specimen of exact art. They were mounted on glass and microscopically enlarged by transmitted light. This was done in order to show the difference between the grain of the bone in the two breeds. These magnified photographs speak for themselves. They bring home the superiority of the bone of the blood horse in a manner admitting of no question or denial. The finer quality and actual amount of his bone explain his ability to carry weight which seems disproportionate to the apparent size of that bone. It should be mentioned that the dark patches on the enlarged photographs, particularly in the case of the thoroughbred, are merely natural colour differences due to the freshness of the bone.

A friend, who is one of the greatest living authorities on the thoroughbred, points out to me the considerable difference in the manner of distribution of the bone in the two breeds. In the case of the Shire it is more or less regular. The shape of the thoroughbred's bone has far more width just where, in his



Shire. *Thoroughbred.*

A problem of resistance.

opinion, greater strength is needed. He calls point A in the appended rough diagrams the line of greatest resistance. If he is right—and though he does not pretend to be a scientist his lifelong knowledge of and experience with blood horses gives him authority to speak—this question of increased power of resistance exactly where it is needed is extremely interesting and instructive. Perhaps some more scientific reader can throw light on the theory which should not be left uncontradicted if incorrect.

While hunting men continue to rely on the outside appearance and measurement of bone in the horses they buy, it seems to me likely that coarser horses will be bred from, though they

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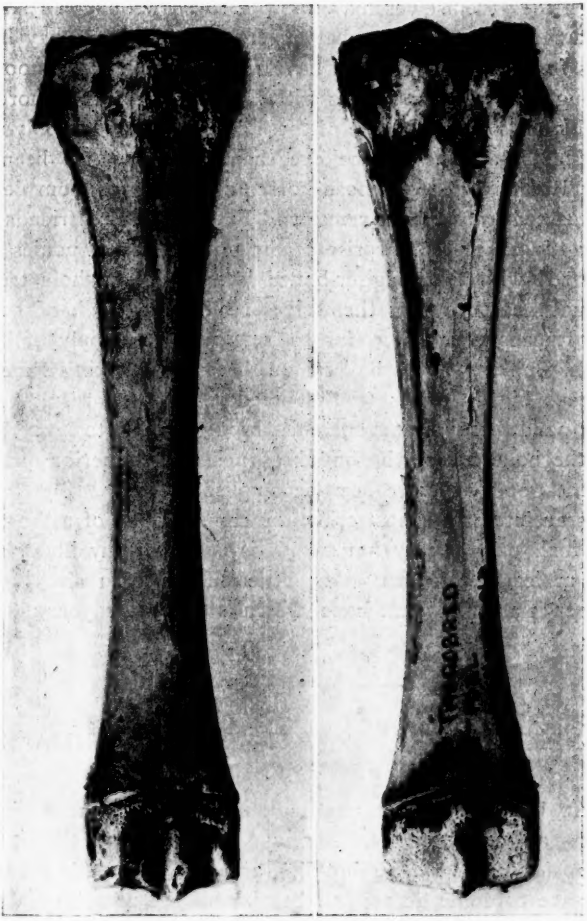
Shire (*side*). *Thoroughbred* (*side*).

Cannon bones. (*Half natural size.*)



Front and back of cannon bone of twenty-hour-old thoroughbred foal.
(*Half natural size.*)

XUM

do not possess the powers which belong to the horse with the lighter looking but more serviceable bone derived from the thoroughbred. Breeders who think only of their own pockets, though they themselves may know it to be wrong, can scarcely be blamed for supplying what buyers want, and will pay higher prices for. For years past I have ridden ponies of Exmoor and thoroughbred cross, and also with Exmoor, Arab and thoroughbred blood in them. Some of these ponies have been only about 14 hands high, and to the eye their bone has not been big. Several of my friends, whose horses always come from dealers, have passed unflattering remarks. But these same friends have constantly expressed surprise at the powers of my ponies when compared with their bigger-boned horses. The whole truth is that until horse buyers themselves realize that bulk of bone is by no means everything, for so long will the supply of horses with big-looking bones be kept up, because, speaking generally, it means higher prices to the breeder. If as a result of this inquiry and these photographs it is brought home to horse lovers that the bone of the thoroughbred possesses superior qualities, no little good will have been accomplished.

As an interesting postscript, the cannon bone of a thoroughbred foal, only twenty hours old, is added to my illustrations. It is at least surprising what little difference in size there is between it and the adult bone, which is of a seven-year-old racehorse.

REPELLENTS FOR PROTECTING ANIMALS FROM FLIES.

THE biting flies that annoy domestic animals most in this country are the stable-fly, *Stomoxys calcitrans*, and the horn-fly, *Lyperosia irritans*. The bot-flies are not biting flies, but are a menace to domestic animals because of the parasitic habits of their larvæ. This is also the case with the screw-worm fly, *Paralucilia macellaria*, which deposits its eggs in wounds, and a bluebottle-fly, *Lucilia sericata*, occurring in the United Kingdom and Holland, and certain species of Calliphora occurring in Australia, the larvæ of which invade the wool and skin of sheep.

Repellents are more or less effective against all of these flies.

Opinions differ with regard to the injury by biting flies. The common opinion seems to be that these flies are responsible for great losses. However, a limited amount of experimental evidence relating to cattle seems to indicate that the losses, when they occur, are not great.

The repellent action of certain colours has been noted by various investigators. Light-coloured animals suffer less from flies than dark-coloured ones. One author (Marre, 1908) has recorded the observation of a farmer in France who found that a blue colour applied to the inside of stables repelled flies. This observation seems to have remained uncorroborated.

Potassium tellurate has been recommended by Ochmann (1911) as an internal remedy for repelling flies. However, Mayer (1911) failed to obtain results with the remedy, and it seems safe to assume that internal remedies will never prove practicable in repelling flies.

Liquid repellents may be applied by means of a dipping vat, a pail spray pump, an atomizer, or by means of a rag or a paint-brush. The method to be employed depends on the individual preference of the farmer and the nature and cost of the preparation used.

The powder remedies that have been used are pyrethrum powder and tobacco powder.

Various oils, emulsions of oils, and mixtures of oils are used in repelling flies. Crude petroleum, cottonseed oil, fish or train oil, and light coal-tar oil may be used pure. Jensen (1909) recommends for dairy cows an emulsion of crude petroleum containing an admixture of powdered naphthalin.

Fish oil is rated as one of the best repellents and has been used alone and in combination with various other substances. Other substances that have repellent qualities and that have been used in various mixtures are pine tar, oil of tar, crude carbolic acid, oil of penny-royal, and kerosene.

Jensen's formula* is said to protect cows for a week. The

* Common laundry soap ... ... 1 lb.
Water ... ... 4 gallons.
Crude petroleum ... ... 1 gallon.
Powdered naphthalin ... ... 4 oz.
Stir well before use.

protective action of fish oil is stated to range from less than two days (Parrott, 1900) to six days. Moore's formula is said to protect for two days. This mixture is safe when applied lightly with a brush, but not when applied liberally with a pail spray pump.

Laurel oil is a very effective repellent. Mayer (1911) found that the protection lasted from two to twelve days. The oil when used pure has an irritating effect unless it is applied lightly. According to Mayer the irritating effect may be overcome by combining it with linseed oil in the proportion of 1 to 10. The present author found that 10 per cent. of laurel oil in cottonseed oil was active for less than a day.

A number of formulas for repellents for application to wounds have been recommended by various authors.

In experimental tests carried out by the present author the following results were obtained:—

A 10 per cent. mixture of crude carbolic acid (21·8 per cent. phenols) in cottonseed oil has a very strong repellent action on flies, but this lasts less than a day, in consequence of which it is necessary to apply the mixture every day. The mixture should be applied lightly with a brush, since a heavy application with a spray pump is likely to cause phenol poisoning.

Mixtures consisting of 10, 20, and 50 per cent. of pine tar in cottonseed oil have marked repellent qualities. They should be applied lightly and it is necessary to apply them every day. A liberal application of a 10 per cent. mixture is deleterious to animals. This is also the case with a half-and-half mixture of pine tar and Beaumont oil when applied lightly with a brush.

A mixture of oil of tar (14 per cent. phenols, volatile with steam) in cottonseed oil and in Beaumont oil has a very marked repellent action. A 10 per cent. mixture of oil of tar in cottonseed oil is safe. A half-and-half mixture of oil of tar and cottonseed oil when applied liberally with a spray pump and 50 per cent. oil of tar in Beaumont oil applied with a brush are not safe. Ten per cent. oil of tar in Beaumont oil is safe. When applied lightly it is necessary to apply 10 per cent. oil of tar in cottonseed oil or 10 per cent. oil of tar in Beaumont oil every day.

Mixtures of 10 per cent. oil of citronella, oil of sassafras, or oil of camphor in cottonseed oil, are powerful repellents, but they are active for less than a day.

A heavy application of fish oil causes the hair to become sticky and fall out. A light application did not produce these results.

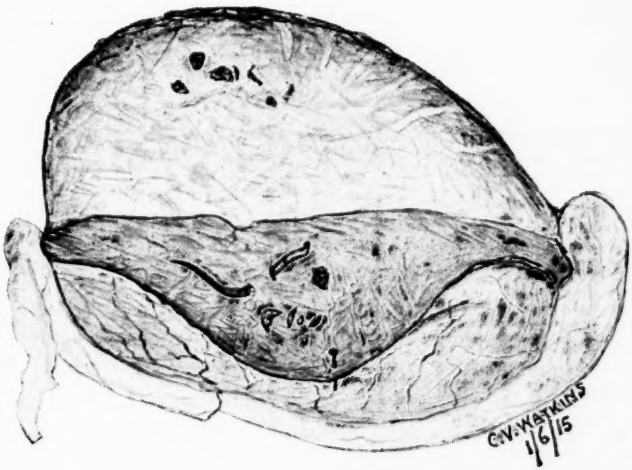
Pyrethrum powder is an effective repellent, but its action lasts only for about a day.—*Bulletin of United States Department of Agriculture.*

General Clinicals.

STRONGYLUS ARMATUS WORM IN THE TESTICLE OF A CRYPTORCHID.

By FREDERICK HOBDAY, F.R.C.V.S., F.R.S.E.
Lieutenant, Army Veterinary Corps, British Expeditionary Force, France.

THE *Strongylus armatus* worm is found fairly frequently in the blood-vessels and surroundings of the testicles of colts when these organs are in their normal situation, but it is not often that they are met with in the interior, and especially are they rarely met with by the cryptorchid operator in abdominally placed testicles. I have been able to obtain records of several such cases,* and herewith add another to the list.



(For this sketch I am indebted to Sergeant C. V. Watkins, Army Veterinary Corps.)

The patient, a very nice black riding horse, 7 years old, was sent into hospital last month by the Veterinary Officer of a Remount Depôt, as a very troublesome and useless, unreliable brute, on account of his "rig" propensities.

Upon examination under chloroform it was found that the right testicle had been removed, and as there was trace of a scar on the left side it was presumed that an attempt had also been made to remove the testicle on the left.

* "Castration and Ovariotomy." Published by W. and H. K. Johnston, Edinburgh.

Examination of the inguinal canal revealed nothing there and the abdomen was entered. A testicle fully three times the normal size was discovered close under the loins, the spermatic cord being very œdematous and as thick as three fingers of a man's hand. It was only after considerable manipulation and trouble that it could be drawn sufficiently into the canal to be secured with the écraseur. The body of the testicle was removed first and then the epididymis. Microscopical examination failed to demonstrate the presence of spermatozoa.

When the testicle was cut open a perfect mature specimen of the *S. armatus* worm was discovered *in situ*, as here depicted, and there are also shown the small excavations in which it moved and lived. The exterior of the organ gave no indication by which one might suspect anything abnormal to be present in the interior.

The horse made an excellent recovery and lost all his bad habits.

A PECULIAR BOWEL CASE.*

By M. W. SULLIVAN, D.V.M.

Marcellus, N.Y.

On September 29 I was called to attend to a draft mare, weight 1,400 lb., aged 8 years. Mare had been driven lightly this day, but previously to this had not been used for a couple of weeks. She drove as well as usual but refused to eat grain, so owner notified me On examination I found mare persisted in lying down most of the time but remained quiet, pulse very weak and fast, temperature about 103·° F., and mucous membrane inflamed. I was not positive as to my diagnosis, so told owner she had an attack of indigestion, although I could not account for the fever. I administered heart stimulants, anti-spasmodics and anti-ferments along with a quart of raw linseed oil, and about two hours later the heart beat became stronger, so I departed. I called on animal for several days and fever slowly abated, after which she began eating.

Subject now appeared to be gaining in flesh and to convalesce

* Read before the Central New York Veterinary Medical Association, at Syracuse, November, 1914.

until October 20th, when I received a hurried call to attend her again. This time she was in intense pain, sweating profusely, and showed all the symptoms of acute indigestion. I followed the usual line of treatment, but the hypodermics of arecoline did not cause any purging, but *did* put the mare in intense pain; so I told the owner that I was practically certain mare had a twist of the small intestines, with a fatal prognosis. Animal gradually grew weaker and died the next day. On account of the peculiarities involved in the case I decided to hold a *post-mortem*, which disclosed the following: I found a very marked twist in the small intestines which involved about 3 ft. of the bowel. On running my hand along the twisted section of the bowel I found an adhesion had formed between the bowel and the peritoneal layer of the abdomen. I incised the adhesion and pus escaped; the inside was gangrenous and contained a piece of timothy hay 2½ in. long.

I conclude that the first attack the mare had was when the piece of hay penetrated the bowel, thus causing peritonitis. The apparent relief was due to the piece of hay becoming encapsulated and finally forming this adhesion which caused the animal's death. —*American Veterinary Review.*

STOMACH RUPTURE NOT FATAL.

By E. P. ALTHOUSE.
Sunbury, Pa.

On November 26, 1914, I was asked to perform an oöphorectomy on a nine-months-old beagle hound bitch. The general condition of the animal was poor and emaciated, but showed a rather large abdomen. After anæsthetizing the patient, I made an incision on the median line posterior to the umbilicus. I had some difficulty in puncturing the peritoneum as it seemed very much thickened. I accomplished it, however, and on introducing the index finger into the abdominal cavity I felt something hard. On removing it, I found it to be the skull of a mouse. On further examniation I removed the carcases of six dead mice.

These foreign bodies had produced a great deal of decomposition, so I decided to continue anæsthesia until death. On *post-mortem*, I found an opening in the right side of the stomach

3 in. in length, with smooth edges, showing that it had existed for some time, and after the dog had swallowed the mice they passed directly into the abdominal cavity. This was a rare case to me and may be of some interest to the profession.

VEGETATIVE ENDOCARDITIS AND CIRRHOSIS OF THE LIVER IN AN AGED BOSTON TERRIER.

By CRITTENDEN ROSS, D.V.M.
New York, N.Y.

In response to a call to see an aged Boston terrier, I found the patient in pretty bad shape, having had no bowel movement for three days, and had been vomiting for the twenty-four hours preceding the time of my visit. A cathartic was administered and an enema of glycerine given. The latter caused an evacuation of the contents of the lower bowels, but the cathartic was not retained; so after the stomach had had a rest of three-quarters of an hour a second cathartic was given, from which an action resulted. The dog could retain no food upon its stomach, however, being kept alive on liquid peptonoid, which it retained, but still the dog continued to grow weaker and weaker, until it was no longer able to stand or move, when the owner decided to have him put to sleep, which was done.

Autopsy.—The stomach was in a catarrhal condition, as well as the intestines; the distal half of the cæcum was distended with dark tarry fæces, while the remainder of that organ was empty. The heart contained vegetative growths in the right auricular appendix and on the tricuspid and bicuspid valves. The liver showed marked cirrhosis.—*American Veterinary Review.*

A GOAT WITH AN ARTIFICIAL LEG.

A goat belonging to Mr. P. J. Carroll, Bailieborough, co. Cavan, Ireland, received an injury to the left foreleg, necessitating its amputation, which operation was successfully performed by Mr. P. G. Connolly, F.R.C.V.S.

The photograph on p. 333 shows the goat wearing an artificial leg.

Photo by J. A. Coleman, Bailieborough.]

A Goat with an Artificial Leg.

EVERSION OF THE RECTUM AND VAGINA IN A SOW.

By C. A. FAST, D.V.M.(1912.)

The patient was a grade Chester White sow weighing 175 to 200 lb. with second litter of pigs. She was delivered of five healthy pigs, but continued to labour and strain. The next morning I was called again to see her and found the mucosa of vagina and rectum everted, forming a mass as large as a human fist. The prolapsed mucosa was replaced, gauze packs inserted, and a strong bandage applied across the perinæum. The owner was instructed not to feed for a few days. Water was allowed. Three days later the owner reported the sow fully recovered, and I advised him to turn her out with the rest of the hogs.

About ten days later estrum came on and with it a return of the eversion of the vagina and rectum. I decided to operate.

XUM

The operation was as follows: After thoroughly irrigating the rectum and vagina I placed a home-made hollow wooden tube in the rectum, ligated, and allowed the prolapsed markedly congested mucosa to protrude. The vaginal mucosa was disinfected, returned, and the lips of the vulva stitched with deep suture, which included the fascia and skin of the perinæum for 1 or 1½ in. on each side.

In three days the protruded ligated mucosa of the rectum sloughed off and the wooden tube passed. Later the stitches in the vulva were removed. The patient made a rapid recovery. At no time was there any increased temperature.

The five pigs died in twenty-four hours due to lack of nourishment.

The wooden tube was made out of an oak pitchfork handle. It was about 1½ by 2½ in., with an opening through its centre 1¼ in. in diameter for the passage of the fæces.—*Veterinary Alumni Quarterly.*

A WRITER in the *Daily Dispatch* writes as follows on the horse famine:—

"It would appear from some facts which came to my knowledge to-day that the Army Remount Department has done its work most effectively, since (according to a leading horse jobber, who is only too sure of the circumstances) there is now scarcely a purchasable horse in the country. On Monday my informant had been to Retford (a journey by rail and motor of 140 miles), only to find that the once important horse fair was a fiasco, not a single horse being seen in the street which was wont to swarm with them on such occasions. Yesterday he made another journey of 40 miles with the same unremunerative result. 'And,' said he, 'not only are there no horses on sale at the fairs, but the whole countryside is bereft of them.' And this must explain to some extent the backwardness of agricultural work. No wonder that the Army authorities have come to the conclusion that the mule is a much more adaptable animal than is generally believed."

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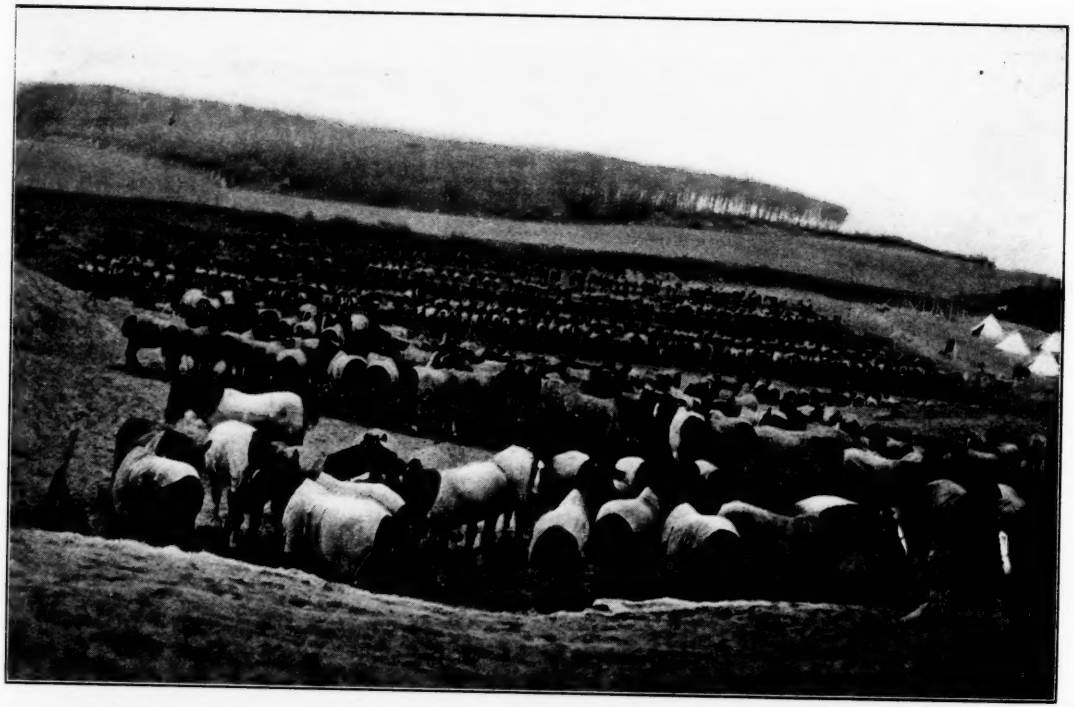
ORIGINAL VIEWS OF ARMY VETERINARY CAMPS WITH THE EXPEDITIONARY FORCE IN FRANCE.

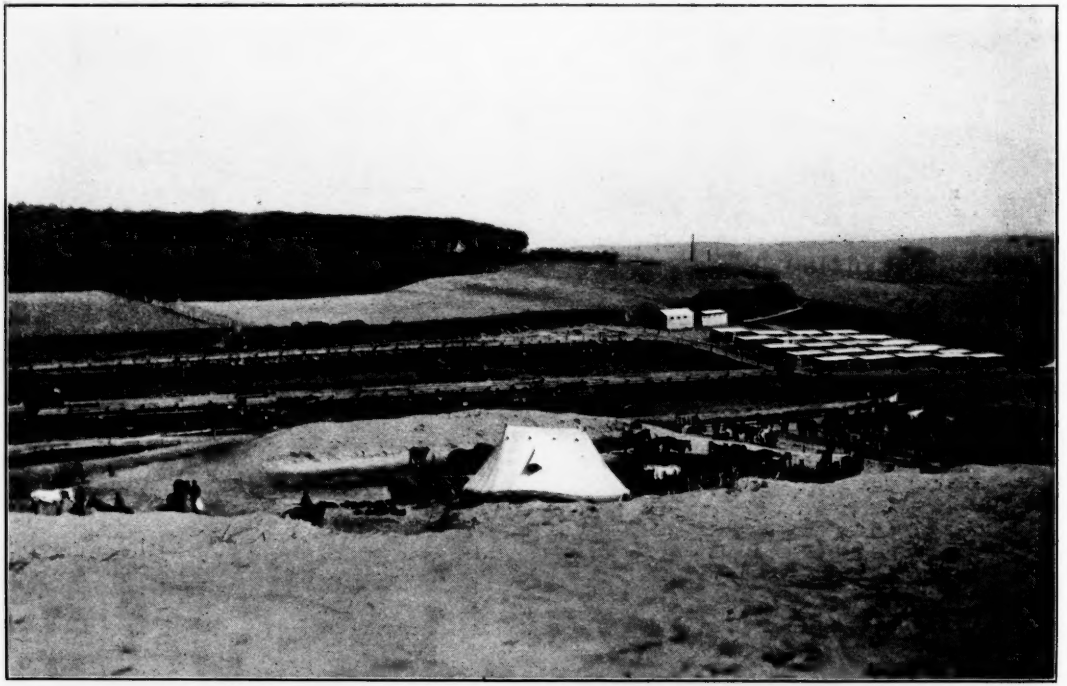
A.V.C. Camp.—Horses suffering from catarrh placed in specially sheltered situation.



A.V.C. Camp (taken in the middle of winter).—Horses are seen clothed for the night. Note the number of horses in the photograph.

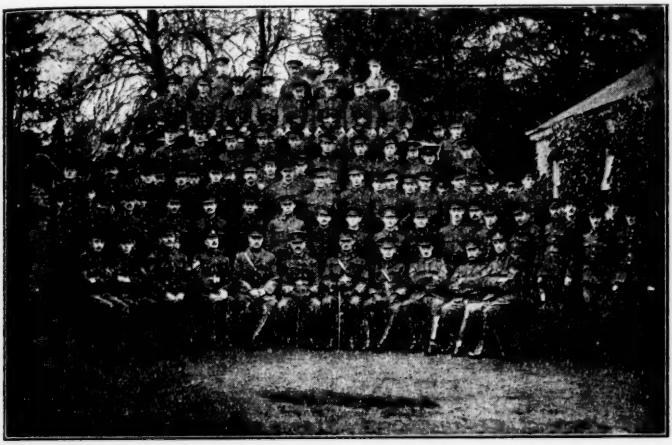
A.V.C. Camp (taken in the middle of winter).—Horses are seen clothed for the night. Note the number of horses in the photograph.

A.V.C. Camp.—A general view, showing first organization.



A.V.C. Camp.—A general view of the same camp as on preceding page, taken about a month later, showing the rapid and clever conversion of centre of camp. New huts instead of tents also are installed.

THE VETERINARY CORPS AT WORK AT HOME.



The Staff, 2nd London Division, Field Veterinary Hospital, St. Albans.

A.V.C. Camp.—A general view of the same camp as on preceding page, taken about a month later, showing the rapid and clever conversion of centre of camp. New huts instead of tents also are installed.

Entrance, London Division, Veterinary Hospital, St. Albans.

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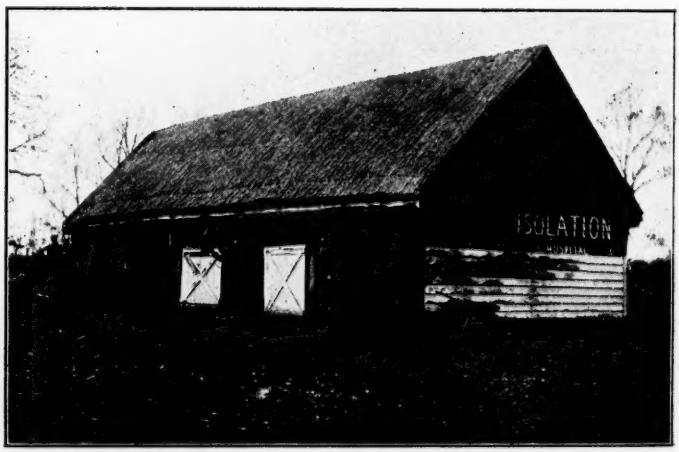
Some of the Buildings, Veterinary Hospital, St. Albans.



Isolation Hospital, 2nd London Division, Veterinary Hospital, St. Albans.

Abstracts.

CANKER.

By WILFRID STOKES, D.V.M.
Fort Riley, Kansas.

The outline of my present treatment is as follows:—

(1) A thorough trimming of the foot.

(2) Removal of spongy material with a sharp knife.

(3) A thorough swabbing with a 25 per cent. solution of formalin in 50 per cent. alcohol.

(4) Covering with a thick layer of pine tar and a *large* mass of oakum.

(5) Application of a bar shoe and leather.

(6) Work.

After a few treatments the parts assume a more healthy appearance with lessened discharge which is now cheesy in consistency instead of fluid. The spread of the disease checks and new horn formation is noticed at the margins. The formalin in this strength is drying but does *not* form a scab. The tar forms an oily covering and protects from ground moisture.

Summary.—It was noticed that caustic line of treatment which had previously extended over a long period was valueless, the case getting worse and the animal was kept idle. Caustics, while drying the surface and forming a hard scab, are valueless on account of the irritation which they produce and cause a severe tissue reaction with a marked serous discharge which accumulates under the scab and the macerating action continues and produces a progressive separation of the horn from normal areas, thus bringing about a spread of the condition. Various dry dressings used occasion a similar effect.

Bacterins may be of value in overcoming the secondary infection but are not essential.

The formalin effectively disinfects and the tar keeps the parts clean.

Arsenic may be of value to the derma. It is interesting to note that prolonged treatment with arsenic (Fowler's solution) for canker in the right foot did not influence the developing case in the left.

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Pressure is very important as it effectually retards or prevents hypertrophy of the sensitive layer, taking the place of the horny layer.

In order to successfully treat these cases it must be borne in mind that the normal protective covering is missing and the enlargement is due to moisture and irritation. Logical treatment is therefore directed to artificially replacing the missing horny layer and excluding moisture, and is essentially *protective* and not *destructive*.

The essentials of the treatment are the *tar and pressure*, the formalin being simply an aid.—*American Veterinary Review.*

ACUTE, SIMPLE AGALACTIA AND ITS TREATMENT IN COWS.

By M. R. STEFFEN.
Brillion, Wisc.

In dairy cows a condition frequently occurs which can only be described as an acute, simple agalactia.

This trouble is usually sporadic in nature, affecting a single cow now and then without any apparent cause.

The history in these cases is nearly always the same. A cow that is otherwise a good milker suddenly gives only about half the usual quantity and at the very next milking is almost completely dry. In every other respect the animal appears normal; eats good, drinks, appears bright and well. Quite careful examination on the part of the attending veterinarian fails to detect any abnormality of value from a diagnostic standpoint.

It is usual to suspect something wrong with the feed, but this suspicion is discarded because all the other cows in the herd are getting the same feed and are not affected.

Apparently this is a condition induced by trophic nerve disturbance of an obscure character. It is always a purely functional disease; no inflammatory or congestive signs occur in the udder which can be determined clinically. The one and only symptom is the absence of lacteal fluid.

The treatment of this condition is based wholly on this aspect of the pathology of the disease, namely, that it is a purely

functional abnormality, and the treatment is very successful. It is quite important that the case be taken in hand promptly, because, to a great extent, the degree of functionating which again develops as a result of the treatment depends upon the length of time that the glands have been idle. A case of this kind properly treated within a day or two after the milk secretion stops will usually come up to the normal output of milk again.

The treatment consists wholly of the administration of two well-known alkaloids, pilocarpine and strychnine.

Four grains of pilocarpine hydrochloride and 2½ gr. of strychnine sulphate are dissolved in a pint of water. This is divided into three doses, one to be given orally every three hours.

Nothing further is required and usually the glands resume their function promptly. Changed feed or special feed does not seem to hasten recovery in these cases. The fact that such feeds which are in ordinary cases more or less of a galactagogue have no effect in this disease is further evidence that we are dealing here with a trophic nerve disturbance more than anything else. —*American Journal of Veterinary Medicine.*

FOLLICULAR MANGE IN THE DOG.

By Professor Gr. I. SLAVU.

Reviewing all the treatment advocated against the rebellious and troublesome disease, the author describes a new treatment which has proved in his hands most satisfactory, having given him lasting radical recoveries. Out of 24 dogs in which the diagnosis had been applied, 16 had the squamous form, localized in some and generalized in the others; 6 had the generalized pustulo-squamous and 2 the papulous. Most of these dogs were in very poor condition. The treatment consists in the application of a phenol camphorated ointment, made of phenol liquid 1 part, pure ordinary camphor 2, white vaseline 6. The treatment requires from nine to sixteen days, according to the severity of the disease.

The technique of the treatment is this—the animal has his coat clipped all over. The body is divided in four parts, every day one part is successively rubbed with the ointment. After four

days a bath of sulphur of potash 2 per cent. is given. The rubbing of the ointment is started on again and the same manipulations carried on three times for mild and four for severe cases. With the pustulous form of the disease it is essential to squeeze out all the pus from the diseased spots before applying the ointment. Sometimes the baths may not be essential, and recovery is obtained just the same.—*Arhiva Veterinar.*

GENERAL ANÆSTHESIA WITH INTRAPERITONEAL INJECTIONS OF CHLORAL HYDRATE.

By GEORGES V. NICHITA, Milit. V.S.

This method of anæsthesia, preconized by Richet for small animals and applied for the first time by Professor Locustaneo for the horse, has been the subject of several experiments made by the writer, which he describes and resumes as follows:—

(1) Intraperitoneal injections of chloral hydrate in horses, donkeys and dogs promote a complete anæsthesia, accompanied with intestinal paralysis.

(2) The anæsthesia is obtained without a previous period of excitement, on an average after 5 minutes in horses, 10 in donkeys, 10 to 15 in dogs.

(3) The best dose of chloral by kilogram weight of the animal is: In horses 0·25 gr. for animals in good condition, and 0·20 gr. for lean and old subjects; in donkeys of 0·35 gr. and 0·30 gr. for pregnant females, in dogs of 0·35 to 0·40 gr.

(4) The anæsthesia lasts on an average: 2 hours in horses, 2¼ in donkeys, 1½ to 2 hours in dogs.

(5) Association with subcutaneous injections of morphia does not increase the action of the anæsthesia by intraperitoneal chloral.

(6) One anæsthesia by chloral does not have any influence upon the general condition of an animal, nor does it give rise to any internal macroscopic lesions.

(7) Injections repeated at short intervals are dangerous. They have a local irritating action in all the three species of animals and a general toxic action in horses and donkeys.

(8) Injections of chloral hydrate are a very good and practical mode of anæsthesia for the performance of many operations.—*American Veterinary Review.*

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ARMY VETERINARY CORPS.

Appointments, Promotions, and Honours.

War Office, Whitehall.

The following names have been mentioned in dispatches by Field-Marshal J. P. D. French, Commanding-in-Chief, the British Army in the Field, dated May 31:—

General Headquarters Staff, &c.

Colonel E. R. C. Butler, F.R.C.V.S.; Lieutenant-Colonel F. Eassie, D.S.O., A.V.C.; Lieutenant-Colonel A. C. Newsom, A.V.C.; Major E. Brown, D.S.O., A.V.C.; Major F. W. Wilson, F.R.C.V.S. A.V.C.; Captain J. J. Aitken, A.V.C.; Captain H. T. Ryan, F.R.C.V.S., A.V.C.; Captain J. J. B. Tapley, A.V.C.

Army Veterinary Corps.

Major J. J. Griffith, F.R.C.V.S. (attached R.F.A. 28th Brigade), Major P. J. Harris, Major F. W. Hunt, Veterinary-Major W. A. Pallin, F.R.C.V.S. (Royal Horse Guards), Captain E. P. Argyle, Captain W. J. Dale, Captain H. Gamble, F.R.C.V.S., Captain M. St. G. Glasse, Captain R. W. Mellard, Captain W. W. R. Neale, Captain W. H. Simpson, Captain W. H. Walker, Lieutenant W. A. J. Buchanan (Special Reserve), Lieutenant C. Davenport, Lieutenant H. E. A. L. Irwin, Lieutenant G. C. Lancaster (Special Reserve), Lieutenant W. McG. Mitchell (Special Reserve), Lieutenant P. B. Riley (Special Reserve), Lieutenant F. B. Sneyd (Special Reserve), Temporary Lieutenant J. M. Dawson, Temporary Lieutenant J. Sherley.

Sergeant-Major A. Hirtes, Unattached List, Indian Subordinate Veterinary Establishment, India Miscellaneous List.

261 Temporary Staff-Sergeant C. Marson, S.E. 176 Sergeant A. Lawie.

Honours.

The King has been graciously pleased to give directions for the following promotions in, and appointments to, the Most Distinguished Order of Saint Michael and Saint George, for services rendered in connection with Military Operations in the Field:—

To be Additional Members of the Second Class, or Knights Commanders: Colonel E. R. C. Butler, F.R.C.V.S., A.V.C.; Major F. W. Hunt, A.V.C.

His Majesty the King has been graciously pleased to approve of the following Honours and Awards for Distinguished Service in the Field:—

Staff.

To be Brevet Lieutenant-Colonel: Major F. W. Wilson, F.R.C.V.S., A.V.C.

To be Companion of the D.S.O.: Captain J. J. B. Tapley, A.V.C.

REGULAR FORCES. ARMY VETERINARY CORPS.

Captain A. F. Deacon to be Temporary Major.

To be Temporary Lieutenants: H. Barnard, W. L. Richardson, L. W. Heelis, J. E. Hutchinson, J. M. Crowe, C. W. Finnemore, F. S. Warburton, F. Booth, A. E. Bayley, P. G. Ledger, G. E. Hamilton, H. G. Simpson, F.R.C.V.S., A. S. Ferguson, G. Simons, J. M. White, J. T. Evans, F. Birkin, M. McPhatter, T. B. Harries, R. T. James, C. O. Maconachie, T. F. Hotchkis, B. P. Boyle, W. Scott.

Commission of Temporary Lieutenant F. W. Gokey is cancelled.

Temporary Lieutenants relinquish their commissions: J. A. Buchan (dated May 24), C. D. Stewart (dated June 3). Temporary Lieutenant R. S. Collihole relinquishes his commission on account of ill-health.

TERRITORIAL FORCE. ARMY VETERINARY CORPS.

To be Major: Captain J. Peddie.

Captain W. L. Harrison, F.R.C.V.S., to be Temporary Major.

The promotion of Captain T. D. Young is antedated to May 11.

Lieutenant A. J. Hines to be Temporary Captain.

J. H. Lockwood (late Veterinary Captain Imperial Yeomanry) to be Temporary Captain. Dated June 15.

To be Lieutenants: L. Crook, G. L. Harber, W. Bushnell, R. H. Stephenson, G. F. J. Prickett, H. Gibson, A. Douglas, H. P. Whipp, C. E. Norgate, Q. A. Stewart, G. W. Balfour.

M. J. Hime (late Lieutenant and Quartermaster Natal Veterinary Corps) to be Lieutenant.

To be Temporary Quartermaster with honorary rank of Lieutenant: J. Hyde (dated May 30), H. R. Rose (dated June 1).

OVERSEA CONTINGENTS. CANADIAN A.V.C.

Captain J. J. McCarry relinquishes his temporary commission. Dated May 7.

Reviews.

The Journal of the Board of Agriculture, June, 1915. Price 4d. Printed by Jas. Truscott and Son, Limited, Suffolk Lane, E.C. Published by the Board of Agriculture and Fisheries, Whitehall Place, London, S.W.

The June number of this well-known agricultural periodical maintains the good reputation of previous monthly issues. If the provision of handy markets, of co-operation in production, buying and selling, are the root and essential forces necessary for the maximum output of agriculture and for the real benefit of the people of these Isles, then the article by A. W. Ashby on "Suggestions from America for Co-operative Selling," which touches aptly on one phase of the question, ought to be of primary value and first importance. It is a piece of writing well worth perusal by all heads of distributing centres. "The Cultivation of Sugar Beet in the West of England," by C. S. Orwin, M.A., and J. Orr, M.A., advocates the suitability of Cornwall for this operation. Any increase of area for sugar beet cultivation is for the national benefit. Useful advice is given on the pages devoted to "Soils and Agriculture of North Wales." "The Prevention of Egg-laying on Turnips by the Diamond-back Moth," and "Experiments on American Gooseberry Mildew in Cambridgeshire." The Irish pig-breeding industry has declined somewhat in recent years, and keeping of pigs by artisans has decreased. Several reasons are given for this: dislike of additional Sunday work, lack of housing accommodation, sanitary restrictions, and substitution of poultry and eggs for pigs, but the authorities consider that the Irish pig-breeding industry will be in a very favourable position in the immediate future because of shortage in Canada, U.S.A., Denmark, and the Continent. The Annual Nutrition Institute of Cambridge University is doing work of paramount importance at the present period, for it is giving expert advice on the cheapest food for all stock from month to month at a time when this country is going through an era of stress hardly ever known before.

The pages devoted to a summary of agricultural experiments are very educative and show that agricultural research is alive and making headway, in various parts of our country. The

Journal of the Board of Agriculture should be in the hands of every progressive agriculturist and on the table of all agricultural scientists. G. M.

A Bacteriological Study of Methods for the Disinfection of Hides infected with Anthrax Spores. By F. W. Tilley. Reprint from *Journal of Agricultural Research,* Department of Agriculture, Washington, U.S.A.

Mr. Tilley, who is the Senior Bacteriologist, Biochemic Division, Bureau of Animal Industry, has given in this pamphlet the history and result of his valuable researches into the question of rendering anthraxed hides innocuous to their handlers. The spores of anthrax in hides are found chiefly in connection with bloodstains, and these and other habitats of the organisms are chiefly colloidal in nature. The problem has been to get at the anthrax spores when embedded in a gelatinous, albuminous, or other colloidal body, without injury to the material or fabric to be disinfected. Searching experiments have been conducted and it has been found that two methods of effective disinfection may be employed. The one called the Seymour-Jones method consists in the use of dilutions of mercuric chloride 1 to 2,500 plus 1 per cent. of formic acid, provided the treated hides are not to be subjected within a week or two to the action of any substance that will neutralize the disinfectant. This would be the case, for instance, if hides were disinfected at foreign ports before shipment to this country; the other method, named the Schattenfroh method, consists of employing hydrochloric acid and sodium chloride in the proportions of 2 per cent. of the acid and 10 per cent. of the salt with forty-eight hours' exposure. This procedure is entirely satisfactory. Neither method exerts any injurious effect for tanning purposes upon hides or leather. G. M.

Translations.

OUR HORSE STOCK, HORSE BREEDING, AND THE WAR.

A SHORT time after the commencement of war an article appeared in the daily press with the title, "The Coming Horse Shortage." It was written by a veterinary officer and was marked by unfavourable prophecies. The commandeering of horse material through the mobilization of the Swiss Army and the sudden cessation of all importing produced their inevitable effects, chiefly on agriculture, in an unexpected form. The lack of horse power produced far more marked results on the gathering of the harvest and the tillage of the fields than the scarcity of man's labour. This fact at the time caused a great and noticeable demand for horses under the age of 4 years (these not being requisitioned). This great request caused a corresponding rise in price for horses of this class, and the figure rose to a height never known before. Where in normal times a good two-year-old colt or filly cost about 800 francs, now they fetch an average of 1,200 francs. A comparison of this circumstance with the maximal valuation given for requisitioned horses shows that the highest figure given under the regulation for commandeering horses is too low. As things were, a suitable revision of the condition was very urgent.

In view of the present and future effect of the lack of horses a memorial was drawn up by the principal horse-breeding societies in Switzerland for presentation to the Department of Agriculture. The Swiss Military Department, by a quickly issued Order, has fully met the views of the memorialists. The official heads of the horse-breeding societies were well received and their views were accepted and are to be furthered by the State. Measures are to be taken to make use of all mares suitable for breeding and not to requisition them for Army purposes. Attempts are to be made to put double the number of mares to the horse than in former years. It is suggested that the stallions, which now cover eighty mares each on an average in the season, may have a larger mare figure given them, and in the case of thoroughbreds the annual supply may be increased by twenty. There is to be a speeding up of home-breeding all round in Switzerland, for she recognizes that all sources of outside equine supply will be closed for many years.—*Swiss Journal of Veterinary Medicine.* G. M.

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FIELD OBSERVATIONS AMONG GERMAN HORSES (RECORDED IN JANUARY) ABOUT VERDUN.

By Veterinary-Surgeon BAMBAUER.

During a severe outbreak of strangles the horses had to remain saddled and harnessed out in the open. In November there was wind, cold, rain and snow, and we bivouacked under the sky, or, if favoured, in fir plantations. The ground was sodden and the horses sank up to their knees therein and lost a considerable number of shoes. There was only a limited ration of oats and for rough food the horses ate fallen fir leaves, withered wood grasses and shrubs, bark of trees, and even saddle-cloths and nosebags.

The shoeing of the horses was in many cases faulty at the time of mobilization. Shoeing in the field was a matter of much difficulty and iron of the wrong size being supplied made matters worse. In future horses should be well shod before entering the service. The usual traumatisms of horses on the march occurred frequently. Saddle and harness sores arose chiefly through the settling of chalky meal like dust on the coat, and stiff and angular leather gear. There were not a few picked up nails. Laminitis, strangles, influenza, purpura, lumbago, &c., were frequent. Only six cases of colic occurred among 650 horses during a period of five months.

When the regiment came into the zone of fire war injuries were frequent. The loss was not great, however, because shelter and cover outside the direct line of fire was sought and new positions and fresh munitions were obtained under shelter of darkness.

The spreading away of artillery missiles behind the firing-line endangered not only the gun teams but allowed the horses no rest and quiet.

Injuries from artillery projectiles, shells, and shrapnel caused large, deep, torn, and shreddy wounds, always earth soiled when caused by missiles striking off the ground. Even bits the size of a lentil seed caused severe injury. Healing of such wounds in the neck, breast, back and croup muscles was only brought about slowly and with difficulty, because the removal of splinters from the deep layer of muscles was almost impossible and suppuration and fistula formation regularly occurred. Comparatively insignificant were the cases of profuse hæmorrhage from such contused wounds. The effect of shell injuries when horses were near the bursting spot was frightful. Entire limbs were torn away, bodies scattered abroad, holes the size of one's head made in the abdomen, and bowels escaping in metre lengths.

Shrapnel balls frequently lodged superficially in the muscles and were often found just under the skin over bones or tendons. One horse struck over the hip-joint had the ball taken out at the stifle. The author warns against too hasty destruction of shot-injured animals. Even very severe wounds often take good ways. Wounds were covered or, if possible, bandaged after

painting with tincture of iodine. Pieces of muslin or gauze were chiefly used as protection. In rainy weather large wounds were treated by inserting and withdrawing muslin tampons soaked in tincture of iodine. All washing or interference with the wounds by fingers or instruments and probing for deeply situated shot was avoided. Blood clots, necrotic tissue, dirt, secretions, and superficially situated foreign bodies were removed. No cases of tetanus occurred through the iodine treatment, which is contrary to the experience in man. Shot and splinters may be leisurely removed after granulation has occurred, and fever, diminished appetite, local swelling and lameness have subsided. Strangles and influenza caused the greatest losses from infectious diseases and outbreaks of the former were very virulent and frequently fatal. The supply of drugs at the commencement of the War was insufficient, but later on it improved. Aloes balls, wadding in rolls and in small packages, and dry lead and alum mixture were vital necessities. The students apportioned as assistants to the veterinary surgeon having only had one or two sessions at clinical work, were often cause for complaint on account of faulty training, lack of knowledge, and clumsiness.

The author comes to the conclusion that a staff veterinary surgeon should always have two riding horses so that he may be in a position to take his assistant with him wherever his services are required.—*Swiss Journal of Veterinary Medicine.*

G. M.

DEATH OF CAPTAIN A. C. ANDERSON, A.V.C.

THIS occurred in front of the Chatelaine Hotel, at Ypres, on April 20. Captain Anderson had his quarters in the remains of the Hotel Chatelaine, he being the A.D.V.S. of the 27th Division at the time. The hotel had been almost destroyed by the German shell-fire.

On the morning of the 20th, as he was coming out of his office, on hearing a shell coming in his direction he ran in between two horses for cover. The shell burst and a portion struck him full in the face, killing him instantly.

His French interpreter was close by at the time but, except for shock, escaped unhurt.

THE DEATH OF LIEUTENANT FOX, A.V.C.

LIEUTENANT FOX, when on the retreat, was killed whilst dressing wounded soldiers in a church—a duty to which he had been allotted as the medical officer was missing. A shell burst in the church killing most of the wounded, and the body of Lieutenant Fox was afterwards found by his Farrier-Major, who had returned to find him. His body was not at all disfigured, in fact, had no mark upon it, death having been due to the concussion.

THE PLACE WHERE LIEUTENANT BRAINSBY JONES, A.V.C., WAS KILLED.

THIS photograph, taken by a brother officer (who has since been killed), shows the hole (14 ft. diameter and 10 ft. deep) made close to the Moulins—Bourg Road by a "Black Maria."

Lieutenant Brainsby Jones was sitting on his horse some yards away reading a letter from home at the time the shell fell. A large fragment struck him on the thigh and injured him severely. He was taken down to the field ambulance, and from thence to the base hospital, where he died.

NOTE.—All communications should be addressed to 8, Henrietta Street, Covent Garden, London, W.C. Telephone, 4646 Gerrard. Telegrams, "Baillière, London."

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